

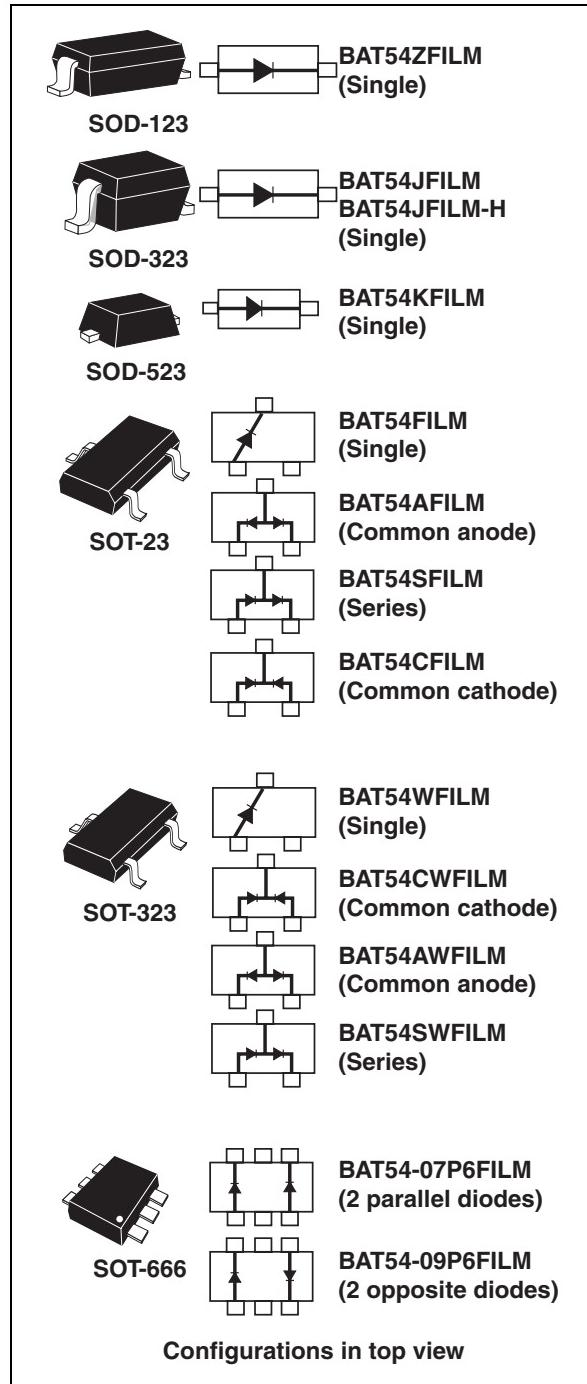
## Small signal Schottky diodes

## Features

- Low conduction and reverse losses
- Negligible switching losses
- Low forward and reverse recovery times
- Extremely fast switching
- Surface mount device
- Low capacitance diode

## Description

The BAT54 series uses 40 V Schottky barrier diodes packaged in SOD- 23, SOD-323, SOD-523, SOT-23, SOT-323, or SOT-666.



**Table 1. Device summary**

Symbol	Value
$I_F$	300 mA
$V_{RRM}$	40 V
C (typ)	7 pF
$T_j$ (max)	150 °C

# 1 Characteristics

**Table 2. Absolute ratings (limiting values at  $T_j = 25^\circ\text{C}$ , unless otherwise specified)**

Symbol	Parameter	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage	40	V
$I_F$	Continuous forward current	300	mA
$I_{FSM}$	Surge non repetitive forward current $t_p = 10 \text{ ms Sinusoidal}$	1	A
$T_{stg}$	Storage temperature range	-65 to +150	$^\circ\text{C}$
$T_j$	Operating junction temperature range	-40 to +150	$^\circ\text{C}$
$T_L$	Maximum soldering temperature	260	$^\circ\text{C}$

**Table 3. Thermal parameters**

Symbol	Parameter	Value	Unit
$R_{th(j-a)}$	Junction to ambient <sup>(1)</sup>	SOT-23, SOD-123	500
		SOT-323, SOD-323,	550
		SOD-523, SOT-666	600

1. Epoxy printed circuit board with recommended pad layout

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = 30 \text{ V}$			1	$\mu\text{A}$
		$T_j = 100^\circ\text{C}$				100	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 0.1 \text{ mA}$			240	$\text{mV}$
			$I_F = 1 \text{ mA}$			320	
			$I_F = 10 \text{ mA}$			400	
			$I_F = 30 \text{ mA}$			500	
			$I_F = 100 \text{ mA}$			900	

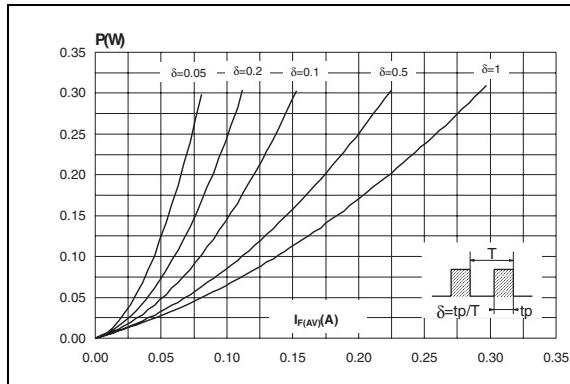
1. Pulse test:  $t_p = 5 \text{ ms}$ ,  $\delta < 2 \%$

2. Pulse test:  $t_p = 380 \text{ }\mu\text{s}$ ,  $\delta < 2 \%$

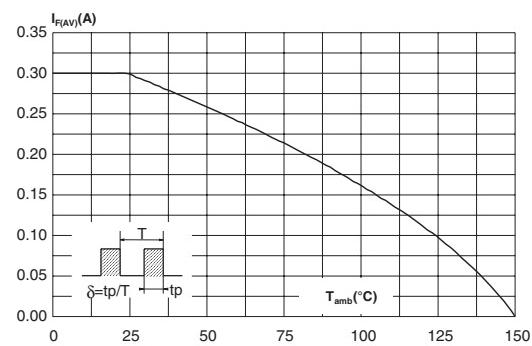
**Table 5. Dynamic characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
C	Diode capacitance	$V_R = 1 \text{ V}$ , $F = 1 \text{ MHz}$			7	10	pF
$t_{rr}$	Reverse recovery time	$I_F = 10 \text{ mA}$ , $I_R = 10 \text{ mA}$ , $T_j = 25^\circ\text{C}$ $I_{rr} = 1 \text{ mA}$ , $R_L = 100 \Omega$				5	ns

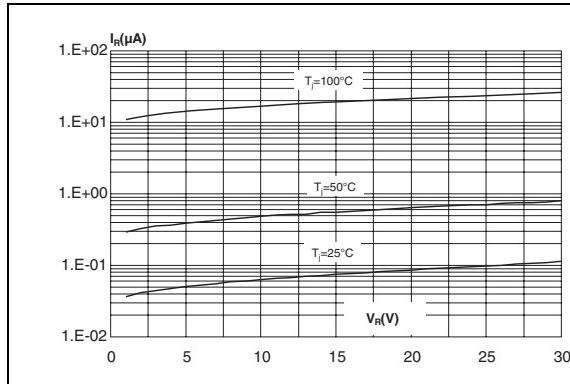
**Figure 1. Average forward power dissipation versus average forward current**



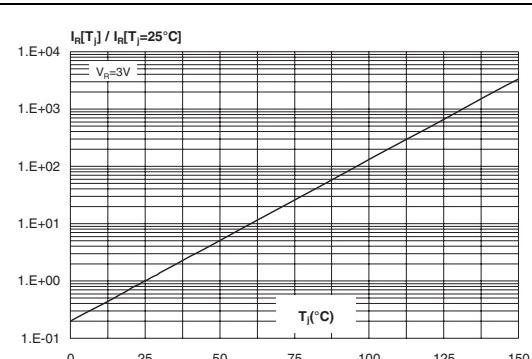
**Figure 2. Average forward current versus ambient temperature ( $\delta = 1$ )**



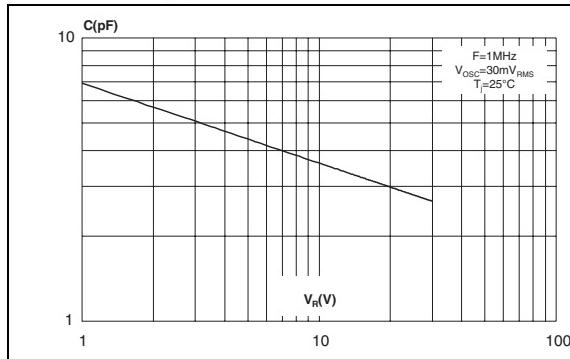
**Figure 3. Reverse leakage current versus reverse applied voltage (typical values)**



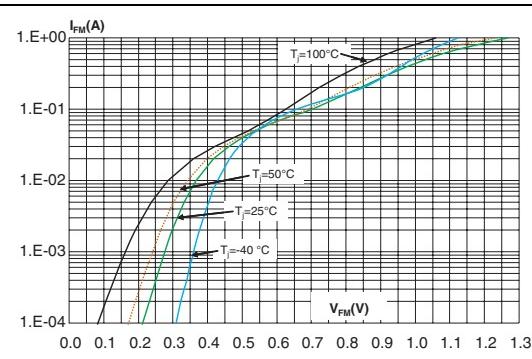
**Figure 4. Reverse leakage current versus junction temperature**



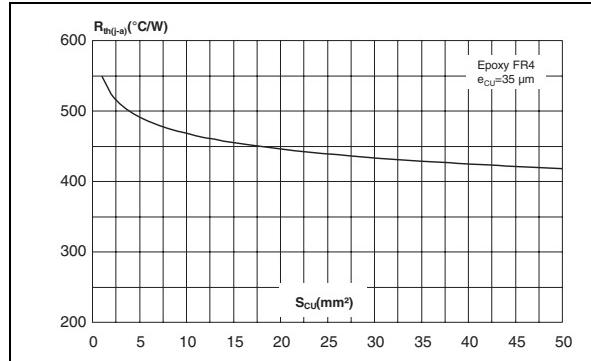
**Figure 5. Junction capacitance versus reverse applied voltage (typical values)**



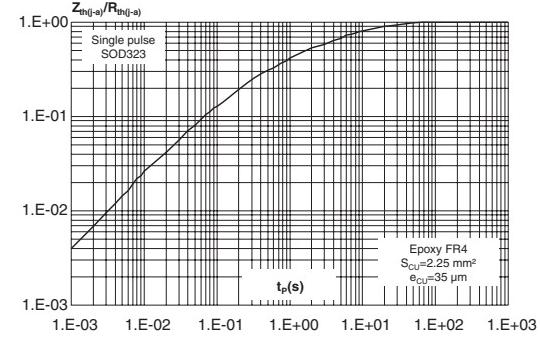
**Figure 6. Forward voltage drop versus forward current (typical values)**



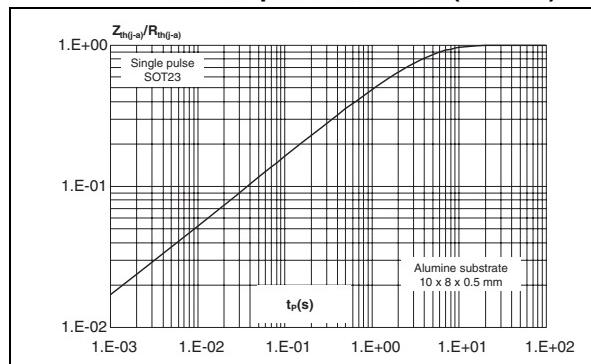
**Figure 7.** Thermal resistance junction to ambient versus copper surface under each lead (SOD-323)



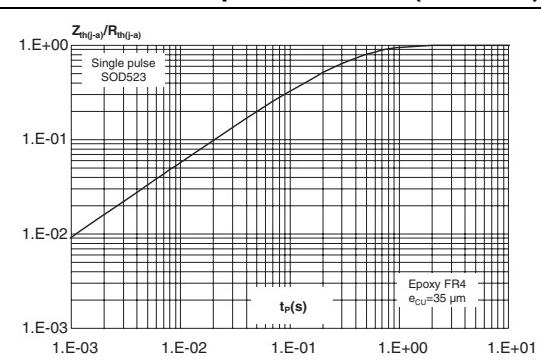
**Figure 8.** Relative variation of thermal impedance junction to ambient versus pulse duration (SOD-323)



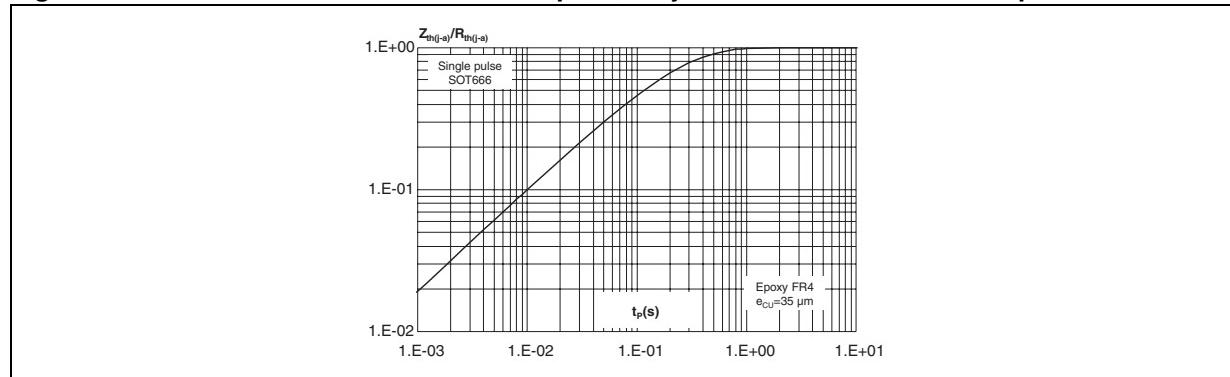
**Figure 9.** Relative variation of thermal impedance junction to ambient versus pulse duration (SOT-23)



**Figure 10.** Relative variation of thermal impedance junction to ambient versus pulse duration (SOD-523)

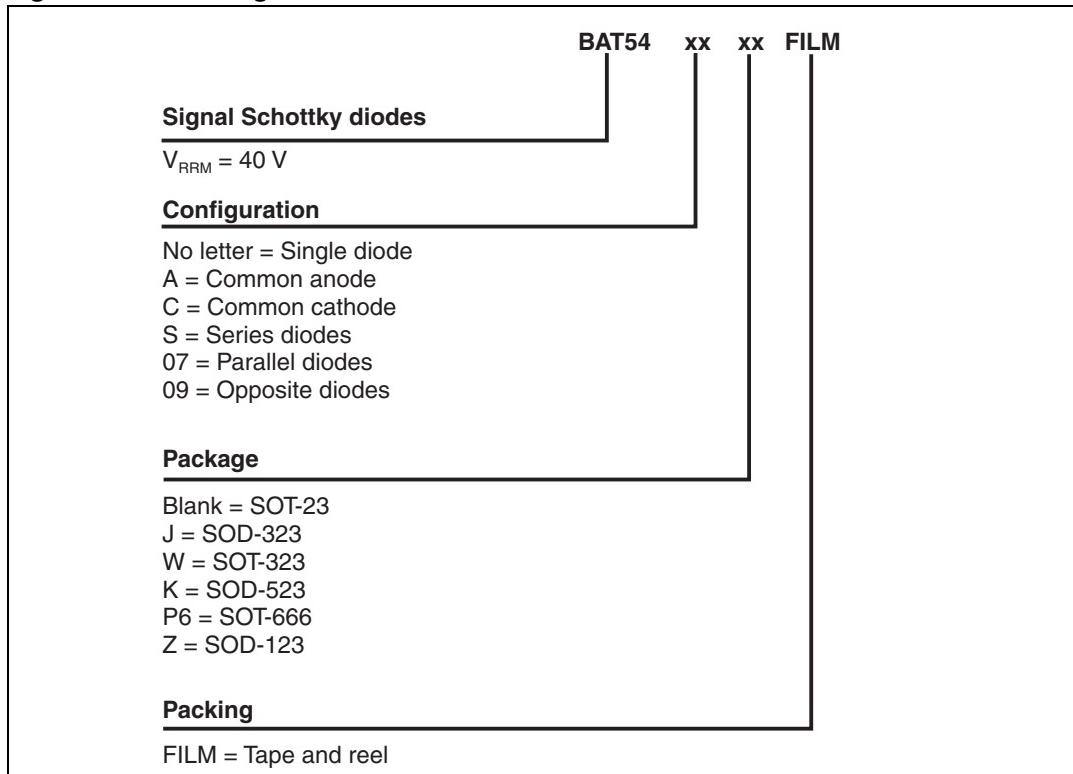


**Figure 11.** Relative variation of thermal impedance junction to ambient versus pulse duration



## 2 Ordering information scheme

Figure 12. Ordering information scheme



### 3 Package information

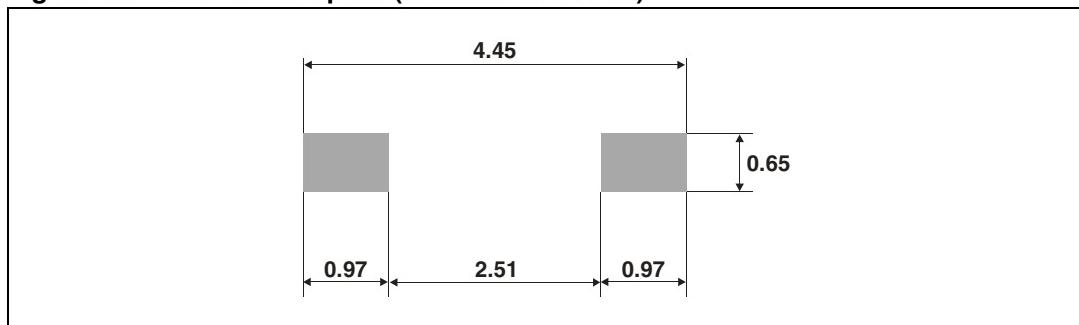
- Epoxy meets UL94, V0
- Lead-free packages

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com).  
ECOPACK® is an ST trademark.

**Table 6. SOD-123 dimensions**

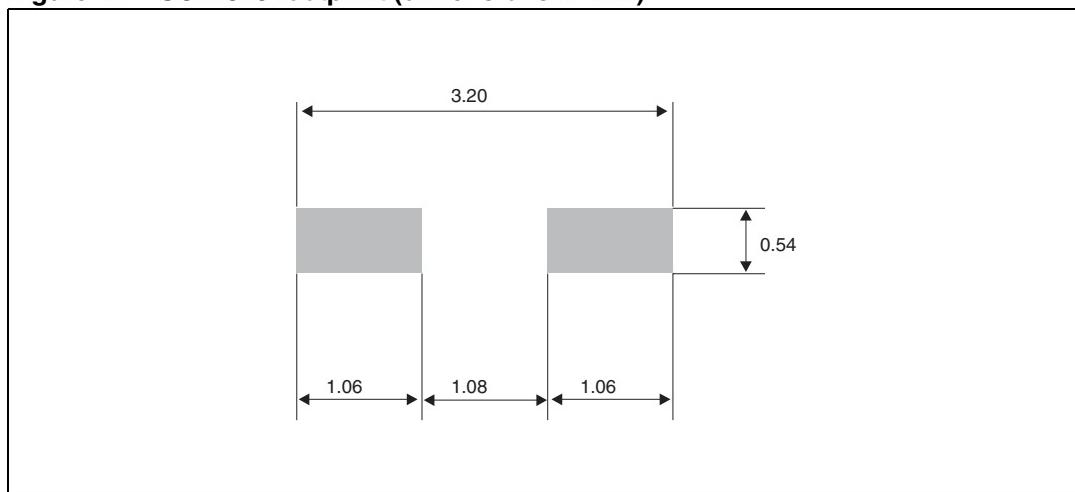
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		1.45		0.057
A1	0	0.1	0	0.004
A2	0.85	1.35	0.033	0.053
b	0.55 Typ.		0.022 Typ.	
c	0.15 Typ.		0.039 Typ.	
D	2.55	2.85	0.1	0.112
E	1.4	1.7	0.055	0.067
G	0.25		0.01	
H	3.55	3.95	0.14	0.156

**Figure 13. SOD-123 footprint (dimensions in mm)**



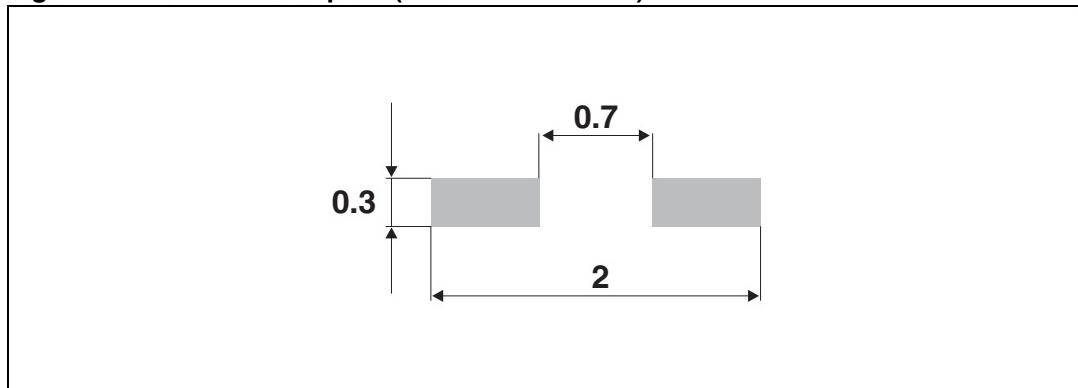
**Table 7. SOD-323 dimensions**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		1.17		0.046
A1	0	0.1	0	0.004
b	0.25	0.44	0.01	0.017
c	0.1	0.25	0.004	0.01
D	1.52	1.8	0.06	0.071
E	1.11	1.45	0.044	0.057
H	2.3	2.7	0.09	0.106
L	0.1	0.46	0.004	0.02
Q1	0.1	0.41	0.004	0.016

**Figure 14. SOD-323 footprint (dimensions in mm)**

**Table 8. SOD-523 dimensions**

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.50	0.60	0.70	0.020	0.024	0.028
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	1.10	1.20	1.30	0.043	0.047	0.051
D	0.70	0.80	0.90	0.028	0.031	0.035
b	0.25		0.35	0.010		0.014
c	0.07		0.20	0.003		0.008
L	0.15	0.20	0.25	0.006	0.008	0.010
L1	0.05		0.20	0.002		0.008

**Figure 15. SOD-523 footprint (dimensions in mm)**

**Table 9.** SOT-23 dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.89	1.4	0.035	0.055
A1	0	0.1	0	0.004
B	0.3	0.51	0.012	0.02
c	0.085	0.18	0.003	0.007
D	2.75	3.04	0.108	0.12
e	0.85	1.05	0.033	0.041
e1	1.7	2.1	0.067	0.083
E	1.2	1.6	0.047	0.063
H	2.1	2.75	0.083	0.108
L	0.6 typ.		0.024 typ.	
S	0.35	0.65	0.014	0.026

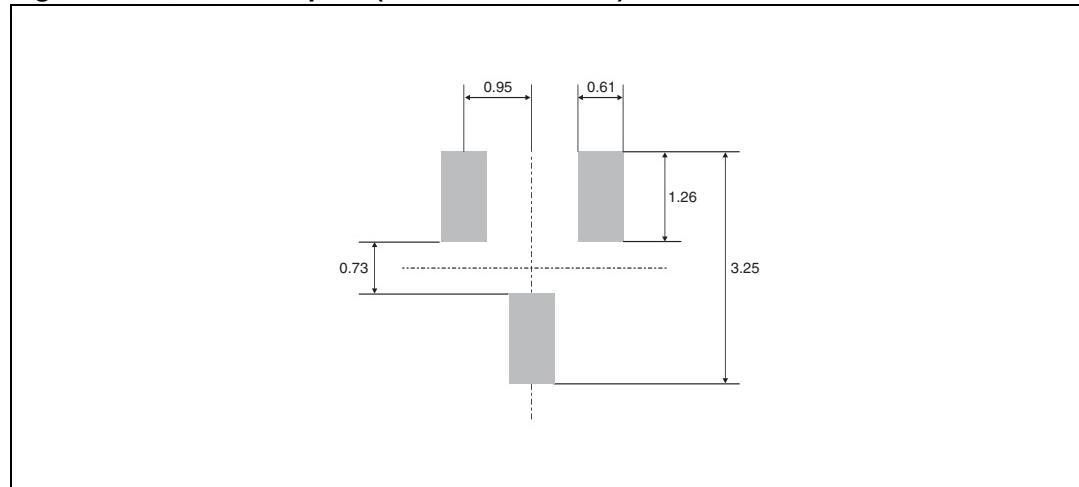
**Figure 16.** SOT-23 footprint (dimensions in mm)

Table 10. SOT-323 dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.8		1.1	0.031		0.043
A1	0.0		0.1	0.0		0.004
b	0.25		0.4	0.010		0.016
c	0.1		0.26	0.004		0.010
D	1.8	2.0	2.2	0.071	0.079	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e		0.65			0.026	
H	1.8	2.1	2.4	0.071	0.083	0.094
L	0.1	0.2	0.3	0.004	0.008	0.012
q	0		30°	0		30°

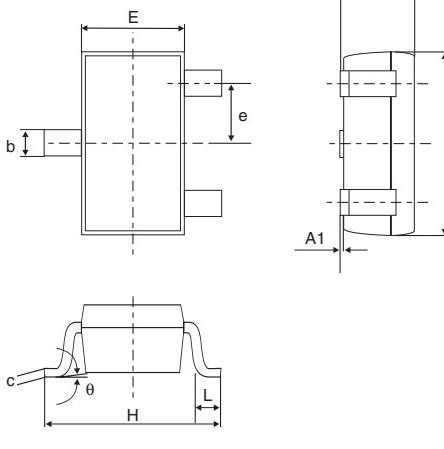
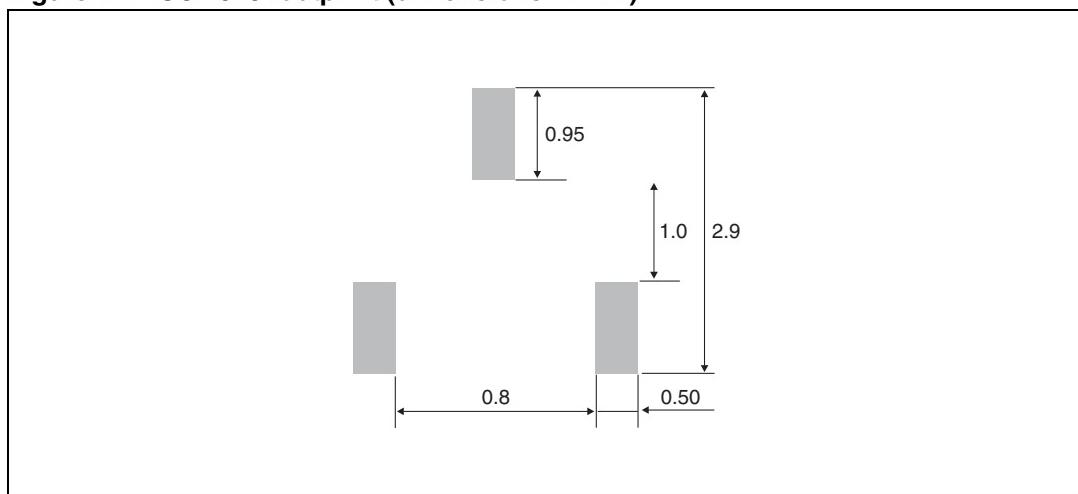
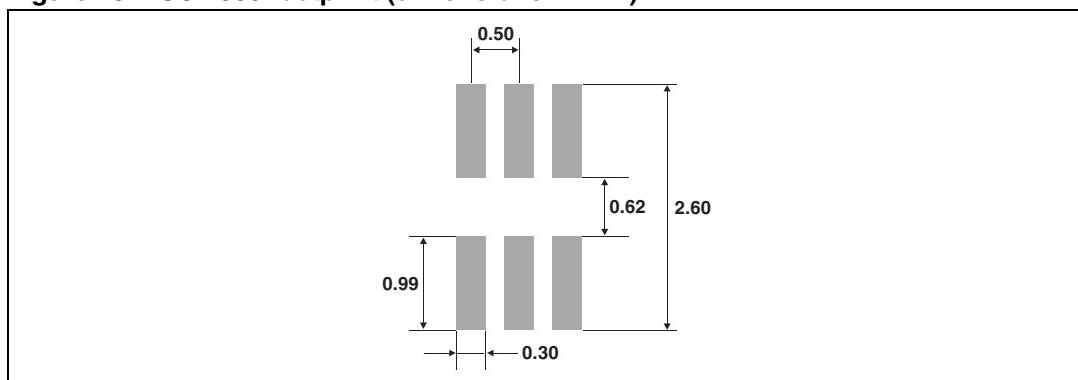


Figure 17. SOT-323 footprint (dimensions in mm)



**Table 11.** SOT-666 dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.45		0.60	0.018		0.024
A3	0.08		0.18	0.003		0.007
b	0.17		0.34	0.007		0.013
b1	0.19	0.27	0.34	0.007	0.011	0.013
D	1.50		1.70	0.059		0.067
E	1.50		1.70	0.059		0.067
E1	1.10		1.30	0.043		0.051
e		0.50			0.020	
L1		0.19			0.007	
L2	0.10		0.30	0.004		0.012
L3		0.10			0.004	

**Figure 18.** SOT-666 footprint (dimensions in mm)

## 4 Ordering information

**Table 12. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
BAT54FILM	D86	SOT-23 Single	10 mg	3000	Tape and reel
BAT54SFILM	D88	SOT-23 Serial	10 mg	3000	Tape and reel
BAT54CFILM	D87	SOT-23 Common cathode	10 mg	3000	Tape and reel
BAT54AFILM	D84	SOT-23 Common anode	10 mg	3000	Tape and reel
BAT54WFILM	D73	SOT-323 Single	6 mg	3000	Tape and reel
BAT54SWFILM	D78	SOT-323 Serial	6 mg	3000	Tape and reel
BAT54CWFILM	D77	SOT-323 Common cathode	6 mg	3000	Tape and reel
BAT54AWFILM	D74	SOT-323 Common anode	6 mg	3000	Tape and reel
BAT54JFILM	86	SOD-323	5 mg	3000	Tape and reel
BAT54JFILM-H	86	SOD-323 ECOPACK® <sup>2</sup> halogen-free	5 mg	3000	Tape and reel
BAT54KFILM	86	SOD-523	1.4 mg	3000	Tape and reel
BAT54-07P6FILM	P4	SOT-666 Parallel	2.9 mg	3000	Tape and reel
BAT54-09P6FILM	Q4	SOT-666 Opposite	2.9 mg	3000	Tape and reel
BAT54ZFILM	D72	SOD-123	10 mg	3000	Tape and reel

## 5 Revision history

**Table 13. Document revision history**

Date	Revision	Changes
Jun-1999	8	Last update.
24-Jul-2006	9	BAT54, A, C, S and BAT54J / W / AW / CW /SW datasheets merged. ECOPACK statement added. SOD-123, SOD-523 and SOT-666 packages added.
13-Oct-2009	10	Updated Table 8 quote "L1" from 0.10 to 0.05.

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